FINAL FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

Submitted to:

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted by:

TechLaw, Inc.
20 North Wacker Drive, Suite 1260
Chicago, Illinois 60606

EPA Work Assignment No.	**R05020**
Contract No.	**68-W4-0006**
TechLaw WAM	**Patricia Brown-Derocher**
Telephone No.	**312/345-8963**
EPA WAM	**Brian Freeman**
Telephone No.	**312/353-2720**

September 10, 1998

20 NORTH WACKER DRIVE, SUITE 1260, CHICAGO, IL 60606

TECHLAW INC.

PHONE: (312) 578-8900
FAX: (312) 578-8904

RZ2.R05020.01.ID.294

September 10, 1998

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DE-9J
77 West Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W9-0006; EPA Work Assignment No. R05020; QAPP Development and Screening; Chemetco, Inc; EPA ID No. ILD048843809; Final Field Sampling and Analysis Report; Tasks 06 and 08 Deliverable

Dear Mr. Freeman:

Please find enclosed TechLaw's Final Field Sampling and Analysis Report (Final Report) for the Chemetco, Inc. facility in Hartford, Illinois. Also enclosed is an electronic version formatted in Word Perfect 6.1 for Windows on a 3.5 inch diskette. This Final Report replaces the draft Report submitted to U.S. EPA Region 5 on August 19, 1998.

Additional analytical testing of archived soil samples was requested by U.S. EPA through a Technical Directive Memorandum (TDM) dated July 15, 1998. The results of these analyses, as well as several minor text changes requested by Mr. Patrick Kuefler, the U.S. EPA Region 5 Technical Lead, have been incorporated into this Final Report.

If you have any questions, please contact me at (312) 345-8963.

Sincerely,

Patricia Brown-Derocher

Patricia Brown-Derocher
Regional Manager

cc: F. Norling, EPA Region 5, w/out attachments
P. Kuefler, EPA Region 5 (5 copies)
W. Jordan, Central Files
K. Higgins
Chicago Central Files

c:\ehs\20\20id294.wpd

FINAL FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

TABLE OF CONTENTS

FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

Section **Page**

Tables

FINAL FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

Tables **Page**

Appendices

FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

1.0 INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) Region 5 requested TechLaw, Inc. (TechLaw) to support the Agency in conducting sample collection at the Chemetco, Inc. (Chemetco) facility in Hartford, Illinois. This document constitutes the Field Sampling and Analysis Report for waste, soil, surface water, and sediment sampling performed by TechLaw at the Chemetco facility.

The sampling event occurred on May 28 and 29, 1998 and was undertaken in accordance with the Site-Specific Sampling and Analysis Plan (SAP) submitted to U.S. EPA on May 8, 1998. The SAP was used in conjunction with TechLaw's U.S. EPA-approved Region 5 Generic Quality Assurance Project Plan (QAPP) for Sampling Operations, dated January 1995. TechLaw utilized QST Environmental Laboratory (Gainesville, Florida), a TechLaw Team Subcontractor, to perform the analyses required under the SAP.

The sampling event was undertaken by TechLaw Field Team members Mr. Kevin Higgins, Mr. John Koehnen, Mr. Doug Updike, and Mr. Anthony Mubiru. Also present during the sampling event were Mr. Patrick Kuefler, U.S. EPA Region 5 and Mr. Chris Chanovsky, Illinois EPA (IEPA). Chemetco was represented during the sampling event by Cindy Davis and Heather Young of CSD Environmental Services (CSD), environmental consultant to the facility.

Maps showing the facility layout and sample locations are provided in Appendix A. A Photograph Log of the sampling event is provided in Appendix B, and Field Logs of all sampling activities are provided in Appendix C. Copies of the chain-of-custody forms are provided in Appendix D, investigation-derived waste manifests relating to the sampling event are provided in Appendix E, and a USGS topographic map showing the facility location is provided in Appendix F.

2.0 FACILITY DESCRIPTION

The Chemetco facility is located at the intersection of Illinois Route 3 and Oldenberg Road, in an industrial and agricultural area in Madison County, Illinois (Appendices A and F). Chemetco operations are conducted on an approximately 40-acre parcel of land surrounded by a chain link fence. Chemetco owns an additional 230 acres of land in the vicinity of the facility. The Chemetco facility is located in the floodplain of the Mississippi River in an area locally referred to as the American Bottoms.

The Chemetco facility was constructed in 1969 and initiated operations as a copper smelter in 1970 to derive copper and other non-ferrous metals and alloys from recyclable copper-bearing scrap and manufacturing residues. The Chemetco facility produces anode copper, cathode copper, and crude lead-tin solder. The facility generates four primary solid waste streams, which are waste slag, zinc oxide, baghouse dust, and spent refractory brick.

Waste slag at the Chemetco facility is generated from both water-cooled and air-cooled processes. File material indicates that slag is stored on-site in areas identified as "Units" (Appendix A). However, during the sampling effort, no distinct boundaries were observed separating the Units, and it appeared the facility managed a single continuous slag pile (Appendix A). Information obtained from the IEPA indicated that the slag had historically been shown to be high in total lead but EP Tox analysis in the 1980s found the slag to not exhibit a characteristic of a hazardous waste under EP Tox. Prior to the sampling effort reported here, it does not appear that the slag piles were analyzed directly to determine if the slag is characteristically hazardous for lead using the Toxicity Characteristic Leaching Procedure (TCLP) since TCLP became the required method of determining if a waste exhibited the characteristic of toxicity.

The facility operates a total of four baghouses to control air emissions from the various operations of the smelter and slag granulation processes (Appendix A). The facility has indicated to U.S. EPA that the baghouse dust is TCLP hazardous for lead and cadmium. Currently, the baghouse dust from all baghouses is reportedly transported off-site as hazardous waste. The four baghouses are designated as:

- No. 1 Baghouse;
- No. 2 Baghouse, also known as the "Roof Baghouse";
- Slag Granulation Plant, Primary Baghouse; and,
- Slag Granulation Plant, Secondary Baghouse.

Process wastewater generated from a venturi scrubber system is currently discharged to an open concrete tank for settling solids which are subsequently de-watered in a zinc oxide filter press. The filter cake from the press is described as zinc oxide. In the past, process wastewater was routed to lagoons for settling and subsequent de-watering of the residual solids. The resulting material was stored on-site in a zinc oxide pile which was later converted to a Zinc Oxide

Bunker. Currently, zinc oxide is staged in this location prior to off-site disposal. The facility has indicated to U.S. EPA that the zinc oxide material currently stored in the Zinc Oxide Bunker and the current zinc oxide generated at the facility are TCLP hazardous for lead and cadmium.

Spent refractory brick from smelting operations is currently generated and stored on-site. Up to five types of spent brick, of various compositions, are currently generated at an unspecified rate. Information obtained from the IEPA indicates that the spent refractory brick is TCLP hazardous for lead and cadmium.

3.0 SAMPLING AND ANALYSIS PROCEDURES

3.1 Waste Streams

The four primary waste streams of concern were characterized during the sampling effort: waste slag, zinc oxide, baghouse dust, and spent refractory brick. All sample numbers and sampling locations (Figure 2 in Appendix A) were determined under the direction of Mr. Kuefler.

Chemetco representatives collected split samples of all waste slag samples and spent refractory brick samples collected by TechLaw. Chemetco did not collect split samples of the zinc oxide or baghouse dust samples collected by TechLaw.

3.1.1 Waste Slag

A total of 20 waste slag samples were collected from the waste slag storage areas (e.g., "Units") and analyzed for RCRA TCLP metals. The total number of samples and the location of the sampling stations were determined in the field at the direction of Mr. Kuefler. In general, sampling locations were spread across the waste slag storage areas (Photos 1 through 19) and comprised waste slag pieces of various sizes from different elevations of the slag pile. In addition to the primary waste slag storage area (i.e., Unit 5) in the northwest corner of the Chemetco facility, waste slag was present across the facility in piles and in roadways (Photo 32).

Five waste slag samples were collected at the "Grizzly" slag hopper conveyors (Photos 1, 2, 3): SL-001, SL-002, SL-003, SL-004, SL-005. Each conveyor sorted the slag into distinct piles based on particle size. Four waste slag samples were collected from a large, excavated area in the vicinity of the waste slag pile (Photo 19): SL-011, SL-012, SL-013, and SL-014. Three waste slag samples were collected in the northeast portion of the waste slag pile: SL-018, SL-019, and SL-020. Eight waste slag samples were randomly collected along the slag roadway leading into the waste slag pile approximately every 75 feet: SL-006, SL-007, SL-008, SL-009, SL-010, SL-015, SL-016, and SL-017.

All waste slag samples were collected using a stainless-steel spoon or stainless-steel hand auger and were homogenized in a stainless-steel bowl. Samples were collected as composites of

sampling locations except for samples SL-006 (Photo 5), SL-013 (Photo 13), and SL-014 (Photo 13) which were collected as discrete, samples of fine waste slag material. The composite samples were collected by sampling from at least three sub-areas within a sampling location. These locations were randomly chosen and were generally in the center of the sampling location. The composited materials were then homogenized to further aid in collection of representative samples.

At some locations, plastic bags were required for the collection of waste slag samples due to the inability to reduce the size of waste slag pieces to facilitate sample collection in 8-ounce, glass jars. The use of the plastic bags is a deviation from the SAP, but is not expected to have an impact on analytical results since inorganics are the constituents of concern.

3.1.2 Zinc Oxide

Four zinc oxide samples were collected from two areas of the facility and analyzed for RCRA total metals and RCRA TCLP metals. Three zinc oxide samples were collected from the Zinc Oxide Bunker (Photos 21 through 25): ZO-001, ZO-002, and ZO-003. One zinc oxide sample (ZO-004) was collected from a front-end loader at the filter press (Photos 26, 27) which had been filled directly from the wastes generated at the filter press on May 29, 1998.

The Zinc Oxide Bunker samples were collected in close proximity to the north portion of the bunker as the wet, un-compacted material represented a potential hazard in relation to collapsing. In addition, an air-purifying respirator (APR) was worn during sample collection.

All zinc oxide samples were collected as near-surface samples from a depth between zero and 6 inches below ground surface. All samples were collected with a stainless-steel spoon and were homogenized in a stainless-steel bowl.

3.1.3 Baghouse Dust

One baghouse dust sample was collected from each of the four baghouses: No. 1 Baghouse (Photo 28); the No. 2 Baghouse, also known as the "Roof Baghouse" (Photos 29, 30, 31); the Primary Baghouse of the Slag Granulation Plant (Photos 33, 34); and, the Secondary Baghouse of the Slag Granulation Plant (Photo 35). The samples were numbered consecutively from BD-001 through BD-004.

All zinc oxide samples were collected as discrete, samples from a depth between zero and 6 inches below the surface of the dust. All samples were collected with a stainless-steel spoon and were homogenized in a stainless-steel bowl. In addition, an APR was worn during sample collection.

3.1.4 Spent Refractory Brick

A total of six spent refractory brick samples were collected from several co-mingled spent refractory brick piles on the southeast side of the Zinc Oxide Bunker (Photos 36, 37, 38, 39, 40) and analyzed for RCRA TCLP metals.. Five brick types were selected in the field at the direction of Mr. Kuefler. The bricks were broken with a hammer and cold chisel to facilitate collection of representative samples and samples split by facility representatives.

A sixth sample was collected as a composite of smaller brick pieces in the pile. This composite sample was collected using a stainless-steel spoon and homogenized in a stainless-steel bowl.

Plastic bags were required for the collection of the spent refractory brick samples due to the inability to reduce the size of brick pieces to facilitate sample collection in 8-ounce, glass jars. The use of the plastic bags is a deviation from the SAP but is not expected to have an impact on analytical results since inorganics are the constituents of concern.

3.2 Soil

A total of 13 soil samples were collected in three general areas surrounding the facility: parking lot (toe area), former spent brick pile, and east runoff area. All soil samples were analyzed for RCRA total metals. Based upon a review of the RCRA total metals results, nine of the thirteen samples were also analyzed for cadmium and lead using the TCLP. Chemetco representatives collected split samples of all soil samples taken by TechLaw.

Four soil samples were collected from the parking lot (Photos 41, 42, 43, 44): SS-001, SS-002, SS-003, and SS-004. Four soil samples were collected from the former location of the spent brick pile to the south of the facility (Photos 45, 46, 47, 48): SS-005, SS-006, SS-007, and SS-008. Five soil samples were collected from the east runoff area located to the east and northeast of the waste slag pile (Photos 49, 50, 51, 52): SS-009, SS-010, SS-011, and SS-012. All sample locations were determined in the field at the direction of Mr. Kuefler.

In addition, three background soil samples were collected and analyzed for RCRA total metals to determine natural, background concentrations of inorganics in the vicinity of the Chemetco facility. One background soil sample was collected in the south wetland area (Photo 63), and two background soil samples were collected in a grassy open field in the area of a residence south of the facility across Long Lake (Photos 64, 65).

All soil samples were collected as near-surface samples from a depth between zero and 6 inches below ground surface. All samples were collected using a stainless-steel spoon or stainless-steel hand auger and were homogenized in a stainless-steel bowl.

3.3 Surface Water and Sediment

A total of eight surface water and eight co-located sediment samples were collected from four different general areas of the facility property and were analyzed for RCRA total metals. Chemetco representatives collected split samples of all surface water and sediment samples obtained by TechLaw.

Three water/sediment samples were collected in the surface water body to the south of the facility identified as Long Lake (Photos 53, 54, 55): SW-001/SD-001, SW-002/SD-002, and SW-003/SD-003. Three water/sediment samples were collected in the south wetland area located to the south of the parking lot (Photos 56, 57, 58): SW-004/SD-004, SW-005/SD-005, and SW-006/SD-006. One water/sediment sample (SW-008/SD-008) was collected in the east runoff area (Photo 62) were it was observed that runoff from the waste slag pile was occurring and had accumulated in this area. One water/sediment sample was collected from a pond identified as a non-contact cooling water pond and stormwater pond within the fenced facility (Photos 59, 60, 61): SW-007/SD-007.

The surface water samples were collected either by directly dipping the sample container into the sampling location or by collecting water in a certified-clean, 8-ounce jar and transferring the water sample to the sample container. Field analytical parameters, including temperature, conductivity, turbidity, pH and dissolved oxygen (DO) were collected using a Horiba Water Quality Monitor. However, due to equipment malfunction, DO measurements are available only for surface water sampling locations SW-001 and SW-002.

All sediment samples were collected as discrete samples from a depth between zero and 6 inches below ground surface. All samples were collected using a stainless-steel spoon or stainless-steel hand auger and were homogenized in a stainless-steel bowl.

3.4 Quality Control Samples

TechLaw personnel collected three types of Quality Assurance/Quality Control (QA/QC) samples: field duplicates, matrix spike/matrix spike duplicates (MS/MSD), and equipment rinsate blanks. One field duplicate was collected for every 10 environmental media samples collected per matrix. An MS/MSD sample was collected for every 20 environmental media samples collected per matrix.

One equipment rinsate blank was collected for every 10 samples collected which utilized the sampling equipment. The equipment blank was collected with certified de-ionized water provided by the contracted laboratory. The equipment blanks were collected from the decontaminated auger heads, a stainless steal spoon, and a stainless steel bowl (Photo 66).

During the course of the sampling event, seven field duplicates, nine MS/MSDs, and five equipment blanks were collected. All QA/QC samples were handled in the same manner described above for the environmental media sampling.

3.5 Sample Custody and Shipment

All sample containers and sample bags were appropriately labeled and tagged in accordance with TechLaw's U.S. EPA-approved Region 5 Generic QAPP. A chain-of-custody (COC) form (Appendix D) accompanied the samples from the point of origin to the analytical laboratory. All samples collected by TechLaw remained in the custody of the TechLaw Sampling Team until shipment to QST Environmental (Gainesville, Florida). All samples were shipped overnight via Federal Express on June 1, 1998. All samples were received by QST Environmental on June 2, 1998 with custody seals intact, as identified in the QST Cooler Receipt Form (Appendix D).

3.6 Data Validation

Analytical data generated by QST Environmental was provided to TechLaw in conformance with Contract Laboratory Program (CLP)-like reporting protocols. All analytical data were validated by a member of the TechLaw Team, independent of the sampling team, utilizing the *Functional Guidelines for Inorganic Data Validation*. Specific data package and data validation procedures are outlined in TechLaw's U.S. EPA-approved Region 5 Generic QAPP.

3.7 Decontamination and Waste Management

All sampling equipment used in the sampling effort was decontaminated before the sampling event and between sample locations using an Alconox® soap wash, a tap water rinse, and a deionized water rinse. Sampling equipment utilized in this effort included stainless-steel spoons, auger heads, and stainless steel bowls.

All investigation-derived waste (IDW), including the decontamination water and all personal protective equipment (PPE), was accumulated in two, 55-gallon, steel drums which were staged on a pad in a secured area on southeast portion of the Chemetco facility property. The staging of the drums was undertaken per the direction of facility representatives from CSD.

A U.S. EPA Identification Number (ILP200000130) and State Of Illinois Identification Number (1198015008) were acquired to allow for the management of the two drums of IDW. Manifests were completed for the two drums of IDW and were signed by Mr. Kuefler, U. S. EPA (Appendix E). The drums were labeled hazardous for RCRA TCLP metals, minus mercury. The drums of IDW were transported by Heritage Transport (IND058484114) on May 29, 1998 to Heritage Environmental Services (IND093219012), a permitted treatment, storage, and disposal (TSD) facility. The two drums of IDW were received by Heritage Environmental Services on June 6, 1998.

4.0 ANALYTICAL RESULTS

4.1 Waste Streams

Analytical results of the waste stream sampling effort are presented in Table 4.1.1. through Table 4.1.4. Undetected constituents are flagged "U" with a corresponding detection limit. Estimated values are flagged "J".

4.1.1 Waste Slag

Analytical results of the waste slag RCRA TCLP metals analysis are presented in Table 4.1.1. All 20 waste slag samples contained TCLP lead concentrations above the regulatory limit of 5 mg/L. Two waste slag samples (SL-014, SL-018) contained TCLP cadmium concentrations above the regulatory limit of 1 mg/L, and waste slag sample (SL-002) is near the cadmium TCLP regulatory limit. No waste slag samples were above the TCLP regulatory limits for arsenic, barium, chromium, mercury, selenium, or silver.

With regards to the waste slag TCLP lead results, statistical calculations were performed on the reported concentrations with the following results (mg/L):

Mean	35.2
Standard Error	4.52
Median	32.75
Standard Deviation	20.23
Sample Variance	409.45
Range	68.1
Minimum Value	11.8
Maximum Value	79.9
Confidence Level (95%)	9.47

The confidence level of the mean (9.47 mg/L) indicates that 95 percent of all TCLP lead results are between 25.7 and 44.7 mg/L (35.2 mg/L +/- 9.47 mg/L). The lower confidence limit of the mean statistically provides an estimate of the minimum value of 95 percent of the slag material which was characterized. The confidence level indicates that 95 percent of the slag pile area which was characterized has a TCLP lead concentration of at least 25.7 mg/L, which is over five times the regulatory limit (5 mg/L). Thus, while 100 percent of the samples are at least two times the regulatory limit (minimum value 11.7 mg/L), over 95 percent of the samples were statistically characterized as over five times the regulatory limit.

Table 4.1.1
Waste Slag TCLP Metal Concentrations
(mg/L)

RCRA Metal	SL-001	SL-002	SL-003	SL-004	SL-005	SL-006	SL-007	SL-008	SL-009	SL-010
Arsenic	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Barium	0.7	1.6	1.0	0.9	0.4	1.7	1.6	1.2	1.4	1.8
Cadmium	0.16	0.93	0.50	0.58	0.01	0.51	0.66	0.16	0.39	0.32
Chromium	0.040	0.027	0.050	0.033	0.015	0.076	0.042	0.028	0.044	0.030
Lead	18.4	16.6	11.8	15.4	20.5	39.2	56.6	14.6	79.9	27.7
Mercury	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ
Selenium	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Silver	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U

RCRA Metal	SL-011	SL-012	SL-013	SL-014	SL-015	SL-016	SL-017	SL-018	SL-019	SL-020
Arsenic	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Barium	0.8	2.7	0.6	0.6	1.7	1.8	0.8	0.8	0.8	0.7
Cadmium	0.21	0.18	0.64	1.11	0.44	0.25	0.01	1.32	0.09	0.23
Chromium	0.031	0.017	0.037	0.058	0.033	0.130	0.020	0.022	0.042	0.030
Lead	54.4	17.2	43.9	50.6	56.0	21.0	38.2	67.7	37.8	17.0
Mercury	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ
Selenium	0.100 U	0.100 U	0.100 U	0.100 U	0.200 U	0.100 U	0.100 U	0.200 U	0.100 U	0.100 U
Silver	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005

4.1.2 Zinc Oxide

Analytical results for zinc oxide samples RCRA total metal concentrations are presented in Table 4.1.2a, and analytical results of zinc oxide samples RCRA TCLP metal concentrations are presented in Table 4.1.2b. All zinc oxide TCLP samples are above the regulatory limit for lead (5 mg/L) and cadmium (1 mg/L).

The lead sampling results indicate differences between the zinc oxide filter press sample (ZO-004) and the Zinc Oxide Bunker samples (ZO-001, ZO-002, ZO-003). The total lead concentration of the zinc oxide filter press sample (ZO-004) is 25,400 mg/L, which is 16 percent less than the mean of the total lead concentrations of the three Zinc Oxide Bunker samples (ZO-001, ZO-002, ZO-003) which was calculated to be 30,066.7 mg/L. However, the TCLP lead concentration of the zinc oxide filter press sample (ZO-004) is 213 mg/L which is 700 percent higher than the mean of the of the three Zinc Oxide Bunker samples (ZO-001, ZO-002, ZO-003) which was calculated to be 30.3 mg/L.

The cadmium sampling results indicate a difference between the zinc oxide filter press sample (ZO-004) and the Zinc Oxide Bunker samples (ZO-001, ZO-002, ZO-003).
The total cadmium concentration of the zinc oxide filter press sample (ZO-004) is 3,010 mg/L, which is 31 percent higher than the mean of the total cadmium concentrations of the three Zinc Oxide Bunker samples (ZO-001, ZO-002, ZO-003) which was calculated to be 2291 mg/L. The TCLP cadmium concentration of the zinc oxide filter press sample (ZO-004) is 23.7 mg/L which is 60 percent higher than the mean of the of the three Zinc Oxide Bunker samples (ZO-001, ZO-002, ZO-003) which was calculated to be 14.8 mg/L.

No zinc oxide samples were above the TCLP regulatory limits for arsenic, barium, chromium, mercury, selenium, or silver. No significant differences between the zinc oxide filter press sample and the Zinc Oxide Bunker samples were noted with regard to arsenic, barium, chromium, mercury, selenium, or silver.

Table 4.1.2a
Zinc Oxide
Total Metal Concentrations
(mg/kg)

RCRA Metal	ZO-001	ZO-002	ZO-003	ZO-004
Arsenic	359	193 U	110 U	130 U
Barium	1190	1580	3100	1280
Cadmium	2890	3280	704	3010
Chromium	100	56.6	50.4	76.9
Lead	40000	32000	18200	25400
Mercury	15.9 J	30.3 J	3.61 J	20.7 J
Selenium	198 U	193 U	110 U	130 U
Silver	43.70	55.50	25.80	105

Table 4.1.2b
Zinc Oxide
TCLP Metal Concentrations
(mg/L)

RCRA Metal	ZO-001	ZO-002	ZO-003	ZO-004
Arsenic	0.100 U	0.100 U	0.100 U	0.100 U
Barium	0.5	0.3	0.6	0.6
Cadmium	22.50	13.40	8.38	23.70
Chromium	0.010 U	0.010 U	0.010 U	0.010 U
Lead	8.5	23.8	58.8	213.0
Mercury	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0005 J
Selenium	1.000 U	2.000 U	0.500 U	1.000 U
Silver	0.050 U	0.100 U	0.005 U	0.050 U

4.1.3 Baghouse Dust

Analytical results of baghouse dust samples for RCRA TCLP metals are presented in Table 4.1.3. All baghouse dust samples were above the TCLP regulatory limit for lead (5 mg/L) and cadmium (1 mg/L).

The TCLP lead concentrations range from 835 mg/L for the No. 1 Baghouse (BD-001) to 27.4 mg/L for the No. 2 Baghouse/Roof Baghouse (BD-002). The Primary Baghouse of the Slag Granulation Plant (BD-003) and the Secondary Baghouse of the Slag Granulation Plant (BD-004) have TCLP lead concentrations of 89.5 mg/L and 48.3 mg/L, respectively.

The TCLP cadmium concentrations range from 56.0 mg/L for the Secondary Baghouse of the Slag Granulation Plant (BD-004) to 7.97 mg/L for the Primary Baghouse of the Slag Granulation Plant (BD-003). The No. 1 Baghouse (BD-001) and the No. 2 Baghouse/Roof Baghouse (BD-002) have TCLP cadmium concentrations of 36.9 mg/L and 54 mg/L, respectively.

No baghouse dust samples were above the TCLP regulatory limits for arsenic, barium, chromium, mercury, selenium, or silver. No significant differences between the baghouse dust samples were noted with regard to arsenic, barium, chromium, mercury, selenium, or silver.

Table 4.1.3
Baghouse Dust
TCLP Metal Concentrations
(mg/L)

RCRA Metal	BD-001	BD-002	BD-003	BD-004
Arsenic	0.100 U	0.100 U	0.100 U	0.100 U
Barium	0.2	0.1	0.3	0.1
Cadmium	36.90	54.00	7.97	56.00
Chromium	0.010 U	0.037	0.010 U	0.010 U
Lead	835	27.4	89.5	48.3
Mercury	0.0006 J	0.11 J	0.0016 J	0.0002 J
Selenium	2.000 U	10.00	0.800 U	0.600 U
Silver	0.100 U	0.500 U	0.005 U	0.005 U

4.1.4 Spent Refractory Brick

Analytical results of spent refractory brick samples for RCRA TCLP metals are presented in Table 4.1.4. Two brick samples (RB-001 and RB-006) are above the TCLP regulatory limit for both lead
(5 mg/L) and cadmium (1/mg/L). All other brick samples are below the TCLP regulatory limits for all RCRA metals.

Brick sample RB-006, with high TCLP lead (6.7 mg/L) and cadmium (1.35 mg/L), represents a composite sample of three areas of brick pieces and associated brick pile material. The material composited for RB-006 represented a visibly significant portion of the spent refractory brick pile (Photos 36, 37).

Table 4.1.4
Spent Refractory Brick
TCLP Metal Concentrations
(mg/L)

RCRA Metal	RB-001	RB-002	RB-003	RB-004	RB-005	RB-006
Arsenic	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Barium	1.0	0.2	0.2	0.5	0.2	1.2
Cadmium	2.21	0.005 U	0.005 U	0.005 U	0.005 U	1.35
Chromium	0.066	0.010 U	2.020	0.010 U	0.852	0.010 U
Lead	33.0	0.1	0.050 U	0.050 U	0.050 U	6.7
Mercury	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ	0.0002 UJ
Selenium	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Silver	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U

4.2 Soil

4.2.1 Parking Lot Soil

The parking lot soil results (Table 4.2.1) indicate high levels of lead and cadmium when compared to the background soil (Table 4.2.4) which contains low mean concentrations of lead (74.6 mg/kg) and cadmium (1.49 mg/kg). One sample, SS-004, contains a significant concentration of chromium when compared to background. However, no significant comparisons with background results were noted with regard to arsenic, barium or mercury.

During the sampling event, the parking lot soil samples were observed to contain a mix of slag, soil, gravel, concrete, refractory brick and sand, and the results indicate high lead levels similar to the slag results. The parking lot soil results range from 2,300 mg/kg to 23,200 mg/kg with a mean concentration of 8,518 mg/kg. All samples contain a minimum of 30 times the mean background lead concentration and are a minimum of nearly six times the 400 mg/kg IEPA Tier 1 Industrial soil clean-up objective for lead. One sample, SS-003 (Photo 43), contains a lead level of 23,200 mg/kg, which is 310 times background and 58 times the 400 mg/kg IEPA Industrial clean-up level.

The parking lot soil results indicate a minimum of 18 times the mean background cadmium concentration. However, no samples are above the 1,000 mg/kg IEPA Tier 1 Industrial soil clean-up objective for cadmium.

One sample, SS-003, contains a total chromium concentration of 488 mg/kg, which is nearly 13 times the mean background soil concentration. This sample also contains a total silver concentration of 40.4 mg/kg which is over 60 times the mean detection limit for silver in background.

All four parking lot soil results are above the TCLP regulatory limit for lead (5 mg/L), the IEPA Tiered Approach to Cleanup Objectives (TACO) Migration to Groundwater Route Value for Class I Aquifers (0.0075 mg/L) and the IEPA TACO Migration to Groundwater Route Value for Class II Aquifers (0.1 mg/L). The mean lead concentration for the four samples is 20.1 mg/L, which is over four times the TCLP regulatory limit.

The parking lot soil results for two samples (SS-001 and SS-004) are above the TCLP regulatory limit for cadmium (1 mg/L). All four soil results are above the IEPA TACO Migration to Groundwater Route Value for Class I Aquifers (0.005 mg/L) as well as the Class II Aquifers value (0.05 mg/L). The mean cadmium concentration is 1.2 mg/L which is 20 percent higher than the TCLP regulatory limit.

Although contaminant concentration comparisons to the various TACO remediation values are provided, the appropriate remediation standards for the site, considering all the necessary site-specific factors, have not been determined at the time of this report.

Table 4.2.1a
Parking Lot Soil
Total Metal Concentrations
(mg/kg)

RCRA Metal	SS-001	SS-002	SS-003	SS-004
Arsenic	24.7	68.1 U	200 U	22.1
Barium	310	481	253	173
Cadmium	51.40	27.50	30.80	46.60
Chromium	21.4	37.7	488	38.8
Lead	3880	2300	23200	4690
Mercury	0.459 J	0.199 J	0.46 J	0.399 J
Selenium	16.40	68.1 U	200 U	20.40
Silver	1.90	3.4 U	40.40	0.97

Table 4.2.1b
Parking Lot Soil
TCLP Metals Concentrations
(mg/L)

RCRA Metal	SS-001	SS-002	SS-003	SS-004
Cadmium	1.67	0.74	0.79	1.64
Lead	26.5	11.5	22.7	20.3

4.2.2 Former Brick Pile Soil

The former brick pile soil sample results (Table 4.2.2) indicate high levels of lead and cadmium when compared to the background soil (Table 4.2.4). During the sampling effort, the former brick pile soil samples were described as being a dark-brown, silty-sand with some clay.

The former brick pile soil lead results range from 639 mg/kg to 8,510 mg/kg with a mean concentration of 3,720 mg/kg, which is 50 times greater than the mean background lead concentration. All sample concentrations are above the 400 mg/kg IEPA Tier 1 Industrial soil clean-up objective for lead.

The former brick pile soil cadmium results range from 5.91 mg/kg to 60.10 mg/kg with a mean concentration of 31.2 mg/kg, which is 21 times grater than the mean background cadmium

concentration. However, no samples were above the 1,000 mg/kg IEPA Tier 1 Industrial soil clean-up objective for cadmium.

Two samples, SS-007 and SS-008, contained silver concentrations of 16.3 mg/kg and 14.0 mg/kg, respectively. These concentrations are a minimum of 23 times greater than the mean detection limit for the undetected values for silver in the background samples.

No significant comparisons with background soil results were noted with regard to arsenic, barium, chromium or mercury for any of the former brick pile soil sample results.

Three of the former brick pile soil samples were submitted for TCLP analysis for cadmium and lead. All three samples exhibit lead concentrations above the TCLP regulatory limit (5 mg/L), the IEPA TACO Migration to Groundwater Route Value for Class I Aquifers (0.0075 mg/L) and the IEPA TACO Migration to Groundwater Route Value for Class II Aquifers (0.1 mg/L). The mean lead concentration for the three samples is 18.0 mg/L, which is over three times the TCLP regulatory limit.

None of the former brick pile soil results are above the TCLP regulatory limit for cadmium (1 mg/L). However, all three soil results are above the IEPA TACO Migration to Groundwater Route Value for Class I Aquifers (0.005 mg/L) as well as the TACO Class II Aquifers value (0.05 mg/L). The mean cadmium concentration is 0.70 mg/L.

Although contaminant concentration comparisons to the various TACO remediation values are provided, the appropriate remediation standards for the site, considering all the necessary site-specific factors, have not been determined at the time of this report.

Table 4.2.2a
Former Brick Pile Soil
Total Metal Concentrations
(mg/kg)

RCRA Metal	SS-005	SS-006	SS-007	SS-008
Arsenic	14.9	17.6	46.2	131 U
Barium	194	260	261	482
Cadmium	5.91	13.90	60.10	45.00
Chromium	11.5	19.1	20.8	31.4
Lead	639	2450	3280	8510
Mercury	0.076 J	0.102 J	0.255 J	0.412 J
Selenium	11.5 U	11.20	12.30	131 U
Silver	0.6 U	2.51	16.30	14.00

Table 4.2.2b
Former Brick Pile Soil
TCLP Metals Concentrations
(mg/L)

RCRA Metal	SS-005	SS-006	SS-007	SS-008
Cadmium	N/A	0.30	0.99	0.73
Lead	N/A	14.2	16.1	23.7

N/A = Not analyzed as directed by U.S. EPA Region 5

4.2.3 East Runoff Area Soil

The distribution of the east runoff soil sample results (Table 4.2.3) indicate higher concentrations of lead and cadmium directly east of the facility (SS-009, SS-010, SS-011) when compared to the soil samples collected to the northeast of the facility (SS-012, SS-013). The three samples to the east (SS-009, SS-010, SS-011) also contain high levels of lead and cadmium when compared to the background soil (Table 4.2.4).

The lead results for SS-009, SS-010, and SS-011 range from 359 mg/kg to 2,380 mg/kg with a mean concentration of 1,286 mg/kg, which is 17 times greater than the mean lead background concentration. Two of the samples (SS-009, SS-010) are above the 400 mg/kg IEPA Tier 1 Industrial soil clean-up objective for lead. These samples (SS-009, SS-010) were taken in close proximity to surface water sample location SW-008 and sediment sample location SD-008 which contained visible surface runoff from the slag pile storage area (Photo 62) (see Section 4.3.3 below).

The cadmium results for SS-009, SS-010, and SS-011 range from 4.96 mg/kg to 18.80 mg/kg with a mean concentration of 13.25 mg/kg, which is nine times greater than the mean background level. However, no samples were above the 39 mg/L IEPA Tier 1 Residential soil clean-up objective, or the 1,000 mg/kg Industrial soil clean-up objective.

No significant comparisons with background soil results were noted for SS-012 and SS-013 located to the northeast of the facility. In addition, no significant comparisons with background were noted for arsenic, barium, chromium, mercury, or silver for any of the east runoff area results.

Two of the east runoff area soil samples were submitted for TCLP analysis for cadmium and lead. Neither sample exhibits lead concentrations above the TCLP regulatory limit (5 mg/L). However, both reported concentrations are above the IEPA TACO Migration to Groundwater Route Value for Class I Aquifers (0.0075 mg/L) and the IEPA TACO Migration to Groundwater Route Value for Class II Aquifers (0.1 mg/L). The mean lead concentration for the two samples is 1.3 mg/L.

Neither of the east runoff area soil cadmium results are above the TCLP regulatory limit (1 mg/L).

However, both soil results are above the IEPA TACO Migration to Groundwater Route Value for Class I Aquifers (0.005 mg/L) as well as the TACO Class II Aquifers value (0.05 mg/L). The mean cadmium concentration is 0.15 mg/L.

Although contaminant concentrations comparisons to the various TACO remediation values are provided, the appropriate remediation standards for the site considering all the necessary site-specific factors have not been determined at the time of this report.

Table 4.2.3a
East Runoff Area Soil
Total Metal Concentrations
(mg/kg)

RCRA Metal	SS-009	SS-010	SS-011	SS-012	SS-013
Arsenic	21.1	24.1	13.7	14.1	10.8 U
Barium	265	549	282	250	244
Cadmium	18.80	16.00	4.96	2.95	2.12
Chromium	14.40	25.7	14.8	12.8	11.1
Lead	1120	2380	359	179	124
Mercury	0.127 J	0.191 J	0.075 J	0.048 J	0.037 J
Selenium	11.7 U	15.40	9.6 U	9.8 U	10.8 U
Silver	1.11	0.70	0.5 U	0.5 U	0.5 U

Table 4.2.3b
East Runoff Area Soil
TCLP Concentrations
(mg/L)

RCRA Metal	SS-009	SS-010	SS-011	SS-012	SS-013
Cadmium	0.19	0.12	N/A	N/A	N/A
Lead	1.41	1.10	N/A	N/A	N/A

N/A = Not analyzed as directed by U.S. EPA Region 5

4.2.4 Background Soil

Background soil results (Table 4.2.4) indicate a notable difference between the concentration of lead in the south wetland area background sample (BK-001) and the residential soil background samples

(BK-002, BK-003). However, no other differences are noted between the three samples or with any of the other RCRA metals.

The south wetland area background sample contained a lead concentration of 112 mg/kg which is two times the mean concentration of the two residential background samples (BK-002, BK-003). It is possible to conclude that the location of BK-001 may have been impacted by surface runoff from the parking lot area. However, the lead concentration in BK-001 is relatively low when compared to the other soil samples (SS-001 through SS-013) and is nearly one-quarter of the IEPA soil clean-up objective. Thus, BK-001 is included in the calculation of the mean soil lead background level and could still be considered a representative background location

Table 4.2.4
Background Soil
Total Metal Concentrations
(mg/kg)

RCRA Metal	BK-001	BK-002	BK-003	Mean
Arsenic	17.9	16.6	15.4	16.6
Barium	193.0	242.0	247.0	227.3
Cadmium	1.82	1.29	1.36	1.49
Chromium	18.6	79.0	16.1	37.9
Lead	112.0	55.5	56.3	74.6
Mercury	0.071 J	0.037 J	0.033 J	0.047 J
Selenium	13.2 U	12.3 U	9.7 U	11.7 U
Silver	0.7 U	0.6 U	0.5 U	0.6 U

4.3 Surface Water and Sediment

Analytical results for the surface water and co-located sediment samples are presented in Table 4.3.1 through Table 4.3.4. The sample results are grouped according to the four areas which were sampled: Long Lake, south wetland area, east runoff area, and the non-contact cooling water pond.

4.3.1 Long Lake

The surface water and sediment sample results (Table 4.3.1) for Long Lake indicate that the sediments of the water body contain high levels of lead and cadmium when compared to background soil samples. However, the surface water samples contained no notable

concentrations of metals, and the sediment samples contain no notable concentrations of arsenic, barium, chromium, mercury, selenium, or silver.

Sediment samples (SD-001, SD-002, SD-003) contain a mean lead concentration of 712 mg/kg which is 10 times greater than the mean lead soil background concentration. All three samples are near or above the 400 mg/kg IEPA Tier 1 Industrial soil clean-up objective for lead.

Sediment samples (SD-001, SD-002, SD-003) contained cadmium concentrations which are notably higher than all soil samples which were collected (Tables 4.2.1, 4.2.2, 4.2.3). The sediment samples contain a mean cadmium concentration of 324 mg/kg, which is 217 times greater than the mean cadmium soil background concentration. All three sediment samples are above the 39 mg/kg IEPA Tier 1 Residential soil clean-up objective for cadmium, but below the 1,000 mg/kg IEPA Tier 1 Industrial soil clean-up objective for cadmium.

Although contaminant concentration comparisons to the various TACO soil remediation values are provided, they may not be appropriate remediation values for sediments. The appropriate remediation standards for the site, considering all necessary site-specific factors, have not been determined at the time of this report.

The surface water samples contained no notable levels of RCRA metals. However, during the sampling event, the water body was observed to be relatively still with no visible flow. The low dissolved oxygen levels (mean 3.8 mg/L) and relatively low turbidity (mean 53 NTU) suggest that there may be minimal mixing and dispersion of sediment contamination which may explain the lower levels of inorganic contamination noted in the surface water samples.

Table 4.3.1
Long Lake
Surface Water and Sediment Total Metal Concentrations

	Surface Water (μg/L)			Sediment (mg/kg)		
RCRA Metal	**SW-001**	**SW-002**	**SW-003**	**SD-001**	**SD-002**	**SD-003**
Arsenic	100 U	100 U	100 U	23.9 U	18.9 U	15.2 U
Barium	83.0	78.2	83.8	225	210	239
Cadmium	12.40	9.90	9.40	566	308	98.10
Chromium	10.0 U	10.0 U	10.0 U	14	14.4	16.4
Lead	50.0 U	50.0 U	50.0 U	1100	383	652
Mercury	0.20 UJ	0.20 UJ	0.20 UJ	0.38 J	0.261 J	0.148 J
Selenium	100 U	100 U	100 U	23.9 U	18.9 U	15.2 U
Silver	5.0 U	5.0 U	5.0 U	1.94	0.90 U	1.63
Temperature (°C)	24.2	24.9	28.5			
Conductivity (μS/cm)	0.468	0.485	0.612			
Turbidity (NTU)	50	70	40			
Dissolved O_2 (mg/L)	3.6	4.0	Not Available			
pH	6.89	7.33	8.06			

4.3.2 South Wetland Area

The surface water and sediment sample results (Table 4.3.2) for the south wetland area indicate that the area contains high levels of lead and cadmium. However, the surface water and sediment of the area contain no notable concentrations of arsenic, barium, chromium, mercury, selenium, or silver.

The surface water samples (SW-004, SW-005, SW-006) contain a mean lead concentration of 9,194 μg/L, and the sediment samples (SD-004, SD-005, SD-006) contain a mean lead concentration of 270 mg/kg, which is nearly four times greater than the mean soil background concentration.

The surface water samples contain a mean cadmium concentration of 291μg/L, which is 27 times the mean cadmium concentration for the surface water samples of Long Lake (mean 10.5 μg/L). Cadmium concentrations in sediments were a minimum of three times the mean soil background concentration.

The surface water in this area exhibited high conductivities, which were all above 2.0 μS/cm. A relatively high turbidity (337 NTU) is noted for SS-004 and maybe related to the depth of the water at this location (Photo 56).

Table 4.3.2
South Wetland Area
Surface Water and Sediment Total Metal Concentrations

	Surface Water (μg/L)			Sediment (mg/kg)		
RCRA Metal	**SW-004**	**SW-005**	**SW-006**	**SD-004**	**SD-005**	**SD-006**
Arsenic	100 U	100 U	153.0	19.1	22.4 U	18.8 U
Barium	1110.0	154.0	2150.0	201.0	246.0	214.0
Cadmium	467.00	54.20	352.00	8.69	6.95	4.65
Chromium	52.1	10.0 U	104.0	18.2	17.0	16.7
Lead	12500.0	481.0	14600.0	298.0	433.0	79.8
Mercury	105 J	0.20 UJ	1.83 UJ	0.057 J	0.102 J	0.07 J
Selenium	100 U	100 U	107.00	17.8 U	22.4 U	14.8 U
Silver	16.5	5.0 U	45.10	0.9 U	1.1 U	0.7 U
Temperature (°C)	26.5	28.5	24.7			
Conductivity (μS/cm)	2.06	2.59	2.06			
Turbidity (NTU)	337	24	45			
pH	8.22	8.19	8.09			

4.3.3 East Runoff Area

The surface water and sediment sample results (Table 4.3.3) for the east runoff area indicate that runoff from the waste slag pile (Photo 62) contains high lead concentrations and relatively high cadmium concentrations when compared to background. However, this area exhibits no notable concentrations of the other RCRA metals.

The lead concentration of 1,490 mg/kg is nearly four times the 400 mg/kg IEPA Tier 1 Industrial soil clean-up objective and nearly 20 times higher than the mean background concentration of 74.6 mg/kg for lead. The cadmium concentration of 8.69 is nearly six times background, however this concentration is well below the 39 mg/kg IEPA Tier 1 Residential soil clean-up objective and 1,000 mg/kg IEPA Tier 1 Industrial soil clean-up objective.

Although contaminant concentration comparisons to the various TACO soil remediation values are provided, they may not be appropriate remediation values for sediments. The appropriate remediation standards for the site, considering all the necessary site-specific factors, have not been determined at the time of this report.

Surface water at this sample location exhibited an extremely high conductivity (20 μS/cm) and pH (11.7). The high turbidity (181 NTU) may be related to the depth of the water at this location (Photo 62).

Table 4.3.3
East Runoff Area
Surface Water and Sediment Total Metal Concentrations

	Surface Water (μg/L)	Sediment (mg/kg)
RCRA Metal	**SW-008**	**SD-008**
Arsenic	100 U	12.6 U
Barium	494.0	313.0
Cadmium	19.7	8.69
Chromium	82.8	23.8
Lead	4350.0	1490.0
Mercury	3.65 J	0.08 J
Selenium	294.00	12.6 U
Silver	5.0 U	0.6 U

Temperature (°C)	20.0
Conductivity (μS/cm)	20.8
Turbidity (NTU)	181
pH	11.7

4.3.4 Non-Contact Cooling Water Pond

The surface water and sediment sample results (Table 4.3.4) for the non-contact cooling water pond indicate high lead and cadmium concentrations. However, the surface water and sediment at this sample location exhibit no notable concentrations of the other RCRA metals.

Surface water at this sample location exhibited an extremely high conductivity (29.5 μS/cm) and pH (10.34). The low turbidity (36 NTU) suggests the high surface water lead and cadmium concentrations may not be related to high suspended solids.

Table 4.3.4
Non-Contact Cooling Water Pond
Surface Water and Sediment Total Metal Concentrations

	Surface Water (μg/L)	Sediment (mg/kg)
RCRA Metal	**SW-007**	**SD-007**
Arsenic	100 U	167.0
Barium	76.8	2430.0
Cadmium	405.00	3450.0
Chromium	12.9	110.0
Lead	9040.0	22600.0
Mercury	8.28 J	8.45 J
Selenium	348.00	144 U
Silver	5.0 U	62.80
Temperature (°C)	33.6	
Conductivity (μS/cm)	29.5	
Turbidity (NTU)	36	
pH	10.34	

5.0 DATA VALIDATION

5.1 Total Metals Data Validation

No analytical results/data reported for any of the media were rejected during the data validation. A total of 360 analytical results for total metals were reported for the sampling effort. Of these results, 232 were reported at a concentration above the method detection limit, and 128 were reported as undetected (U). Estimated concentrations (J) were identified only for the mercury results.

The samples were analyzed in four sample delivery groups (SDGs). The data packages for the SDGs contained all documentation and data necessary to conduct a complete quality assurance review (e.g., data validation).

Completeness

The results reported by the laboratory were 100-percent complete and legible. No data were rejected and all data are useable as reported.

Holding Times

Analytical holding times were assessed to determine whether the holding time requirements were met by the laboratory. Holding times were met for all analytes, except mercury. All values for mercury were qualified as estimated and flagged "J".

Method Blank Analyses

No analytes were detected in the laboratory or field blanks at concentrations greater than two times the method detection limit.

Calibration

Initial calibration, continuing calibration verification, contract-required detection limit standards, and continuing calibration blank analyses met the criteria for acceptable performance and frequency of analysis for all total metals.

Interference Check Samples for ICP Analyses

All interference check sample results met the criteria for acceptable performance and frequency of analysis.

Accuracy

The accuracy of the analytical results were evaluated in terms of analytical bias by assessing Laboratory Control Samples (LCSs) and matrix spike recoveries and in terms of precision by assessing laboratory duplicates.

Laboratory Control Sample Recoveries

The recoveries for all LCSs and the frequency of analysis met the criteria for acceptable performance.

Matrix Spike Recoveries

The recoveries for all matrix spike samples and the frequency of analysis met the criteria for acceptable performance. For one SDG (SDG G91185), several target analyte results were outside the percentage control limit range and not within criteria acceptance. However, the original sample concentrations in these instances were more than four times the spike concentrations and the sample results did not require qualification.

Precision

The results for all duplicate sample analyses and the frequency of analysis met the criteria for acceptable performance.

Serial Dilution of Samples for ICP Analyses

All serial dilution results for the samples analyses met the criteria for acceptable performance and frequency of analysis.

Analyte Quantification and Method Detection Limits

The calculation for analyte quantification and method detection limits were acceptable for all target analytes.

Field Quality Control

The results for all field quality control samples associated with the sampling effort were acceptable.

Equipment Rinsate Blanks

No target analytes were detected in the field equipment blanks.

Field Duplicates

The precision for field duplicate analysis was acceptable and most of the relative percentage difference results were less than or equal to 35 percent.

Sample Result Verification

Raw data were examined for anomalies, transcription errors, and reduction errors. Sample results were examined for calculation errors to ensure that the reported results were accurate. All reported values were found to be acceptable.

5.2 TCLP Metals Data Validation

No reported data were rejected or qualified during the data validation for the additional analysis requested by U.S. EPA. A total of nine analytical results for TCLP lead and nine analytical results for TCLP cadmium were reported for the sampling effort with all 18 results being reported at a concentration above the method detection limit. The samples were analyzed in one sample delivery group (SDG) with the SDG containing all documentation and data necessary to conduct a complete quality assurance review.

Completeness

The results reported by the laboratory were 100-percent complete and legible. No data were rejected and all data are useable as reported.

Holding Times

Analytical holding times were assessed to determine whether the holding time requirements were met by the laboratory. Holding times were met for all analytes.

Method Blank Analyses

No analytes were detected in the laboratory or field blanks at concentrations greater than two times the method detection limit.

Calibration

Initial calibration, continuing calibration verification, contract-required detection limit standards, and continuing calibration blank analyses met the criteria for acceptable performance and frequency of analysis for all total metals.

Interference Check Samples for ICP Analyses

All interference check sample results met the criteria for acceptable performance and frequency of analysis.

Accuracy

The accuracy of the analytical results were evaluated in terms of analytical bias by assessing Laboratory Control Samples and matrix spike recoveries and in terms of precision by assessing laboratory duplicates.

Laboratory Control Sample Recoveries

The recoveries for all LCSs and the frequency of analysis met the criteria for acceptable performance.

Matrix Spike Recoveries

The recoveries for all matrix spike samples and the frequency of analysis met the criteria for acceptable performance. Results of matrix spike and matrix spike duplicate were outside the percentage control limit range and not within criteria acceptance. However, the original sample concentrations in these instances were greater than four times the spike concentrations. Therefore, the results did not require qualification.

Precision

The results for all duplicate sample analysis and the frequency of analysis met the criteria for acceptable performance.

Serial Dilution of Samples for ICP Analyses

All serial dilution results for the samples analyses met the criteria for acceptable performance and frequency of analysis.

Analyte Quantification and Method Detection Limits

The calculation for analyte quantification and method detection limits were acceptable for all target analytes.

Field Quality Control

The results for all field quality control samples associated with the sampling effort were acceptable.

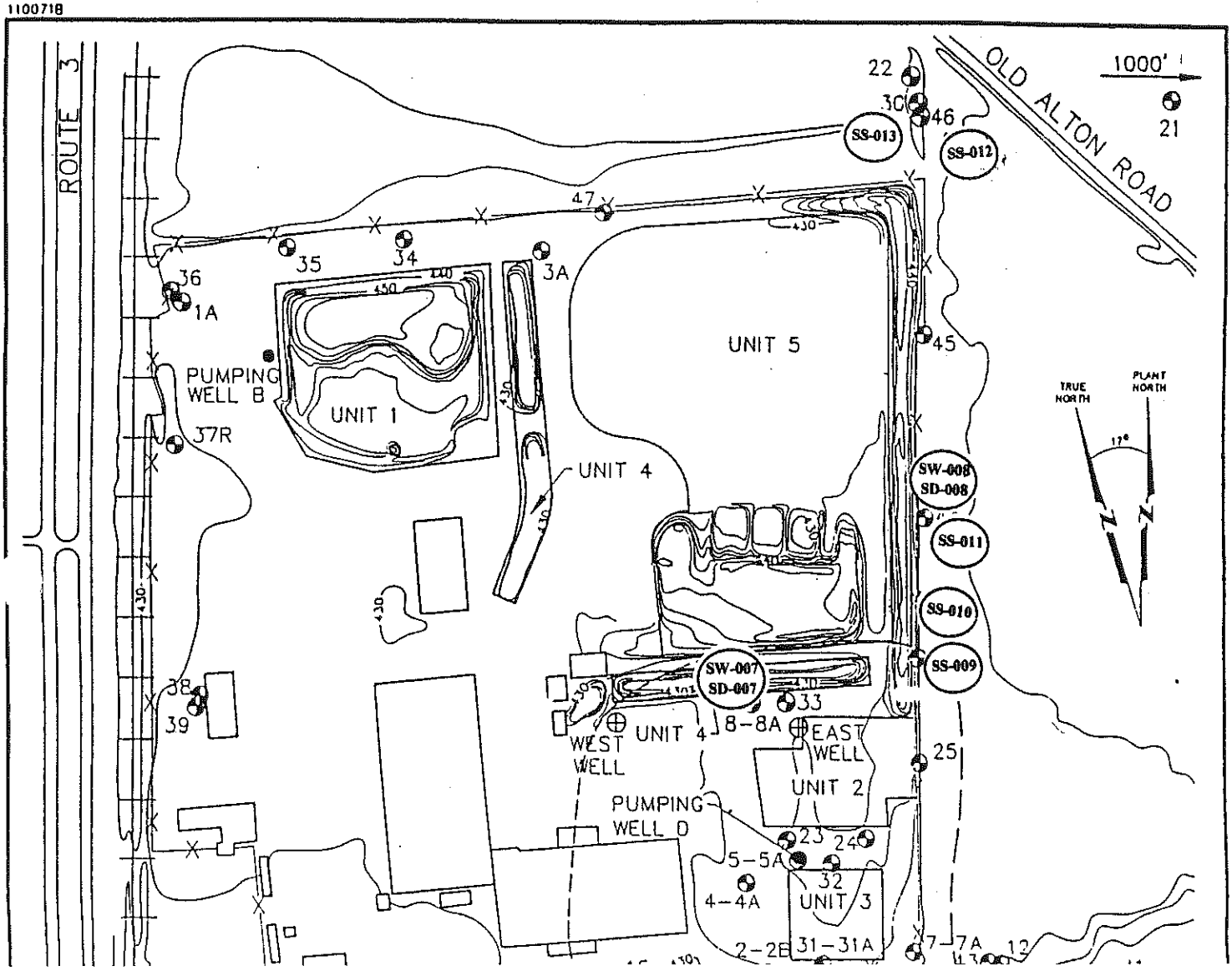
APPENDIX A

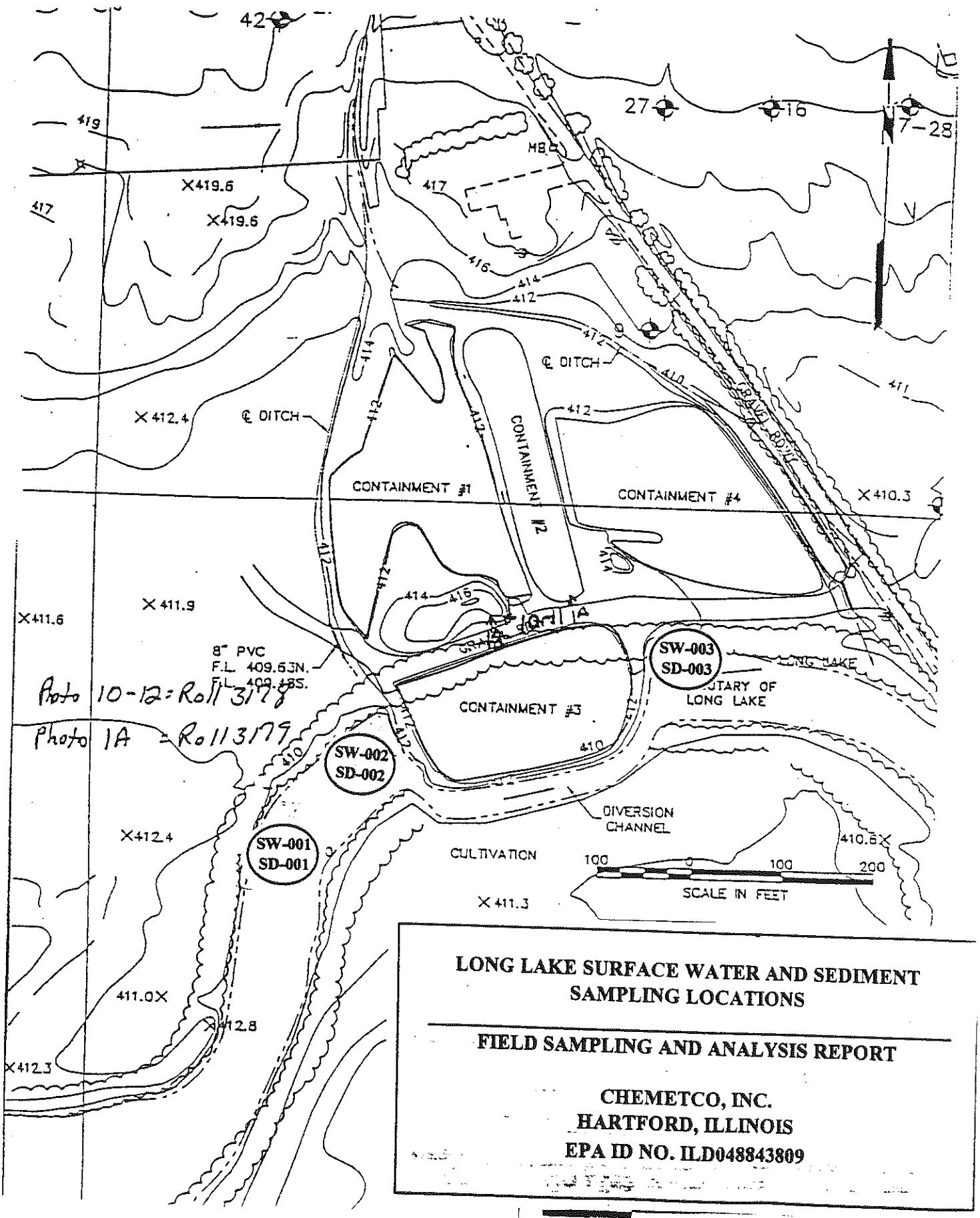
FACILITY LAYOUT AND SAMPLE LOCATIONS

FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

1100718

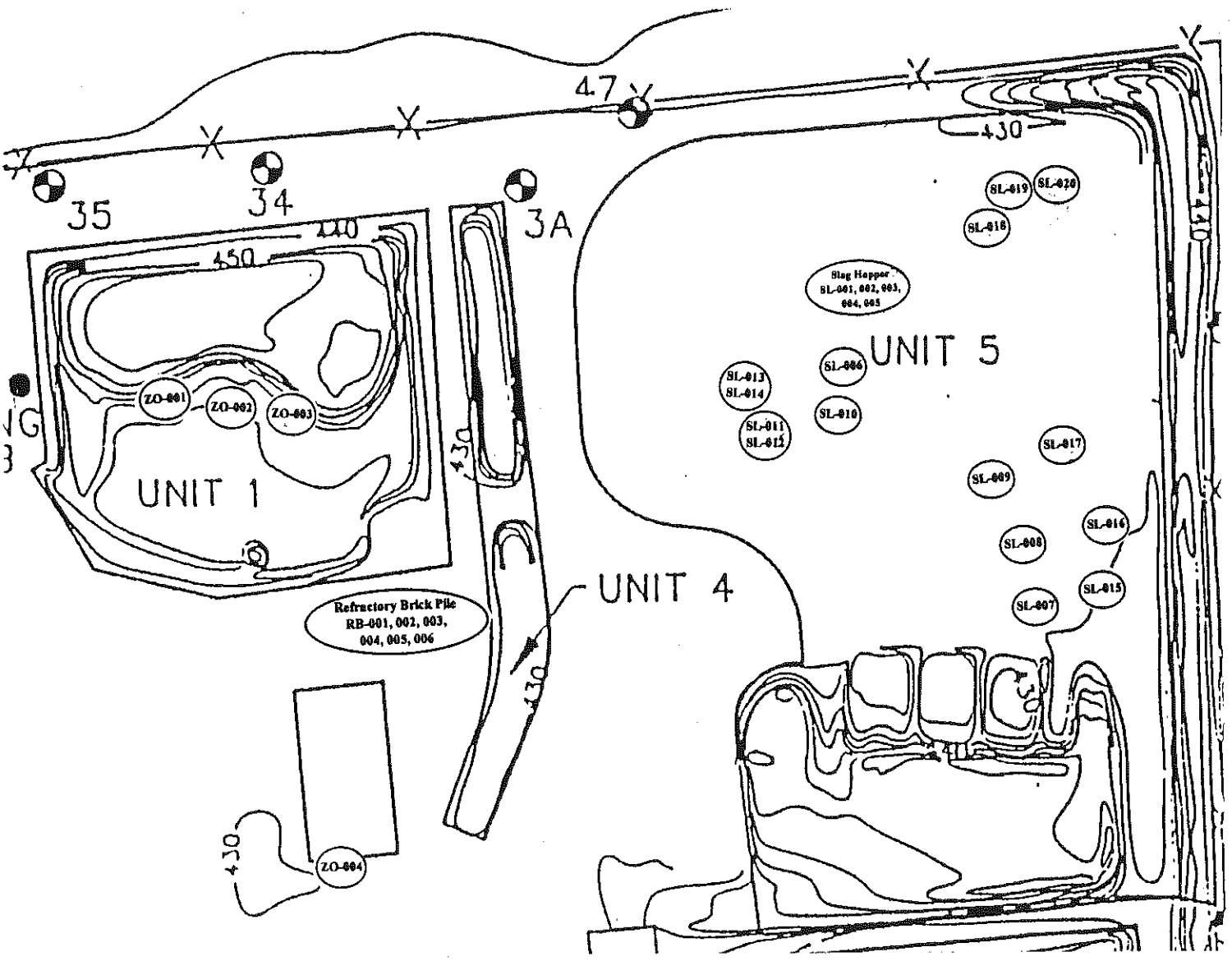

ROUTE 3
OLD ALTON ROAD
1000'
22
30
46
21
SS-013
SS-012
47
35
34
3A
36
1A
UNIT 5
45
PUMPING
WELL B
UNIT 1
37R
TRUE
NORTH
PLANT
NORTH
17°
SW-008
SD-008
SS-011
UNIT 4
SS-010
SS-009
SW-007
SD-007
38
39
33
WEST
WELL
UNIT 4
8-8A
EAST
WELL
25
UNIT 2
PUMPING
WELL D
23
24
5-5A
4-4A
32
UNIT 3
2-2B
31-31A
7-7A
12

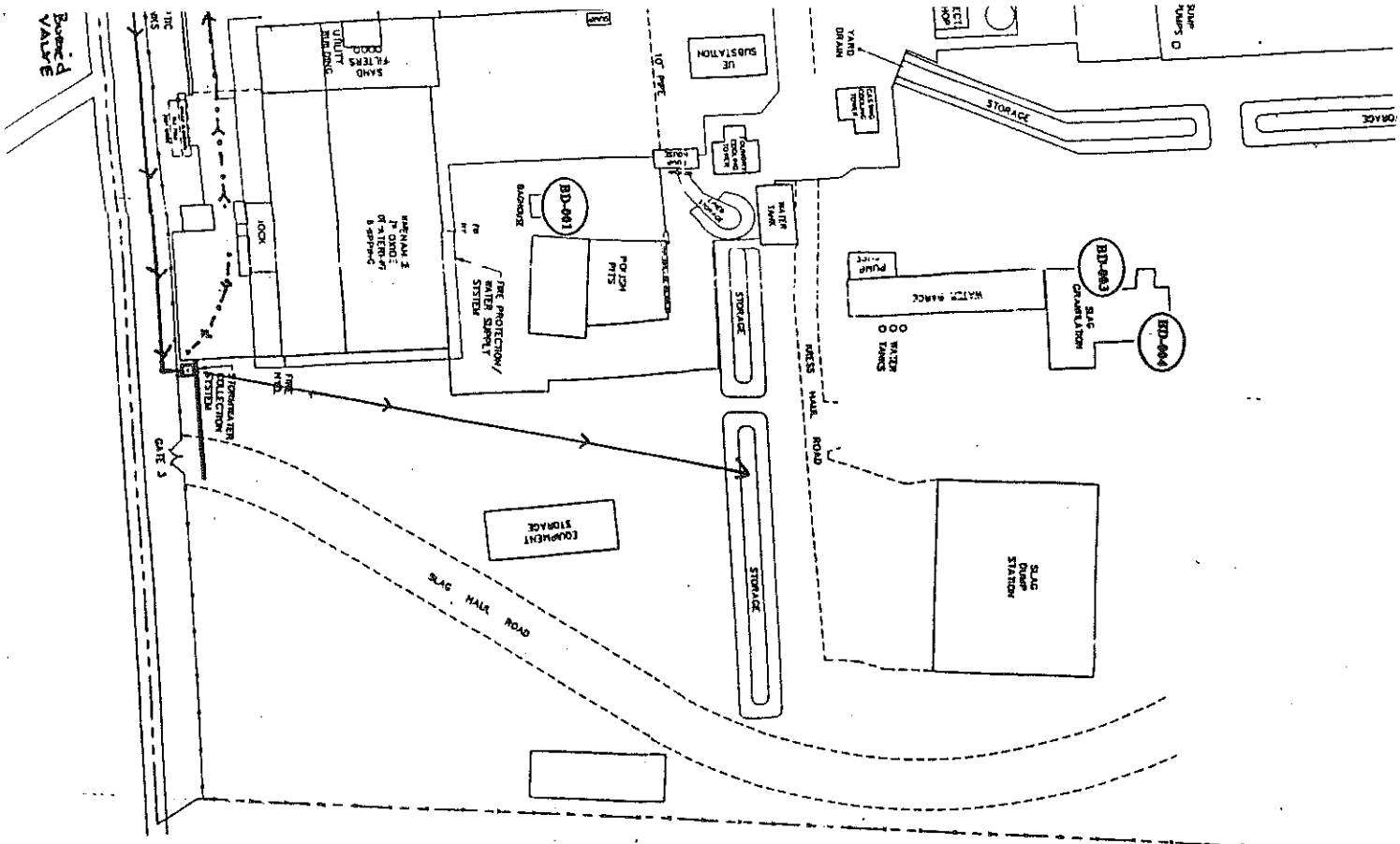


LONG LAKE SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

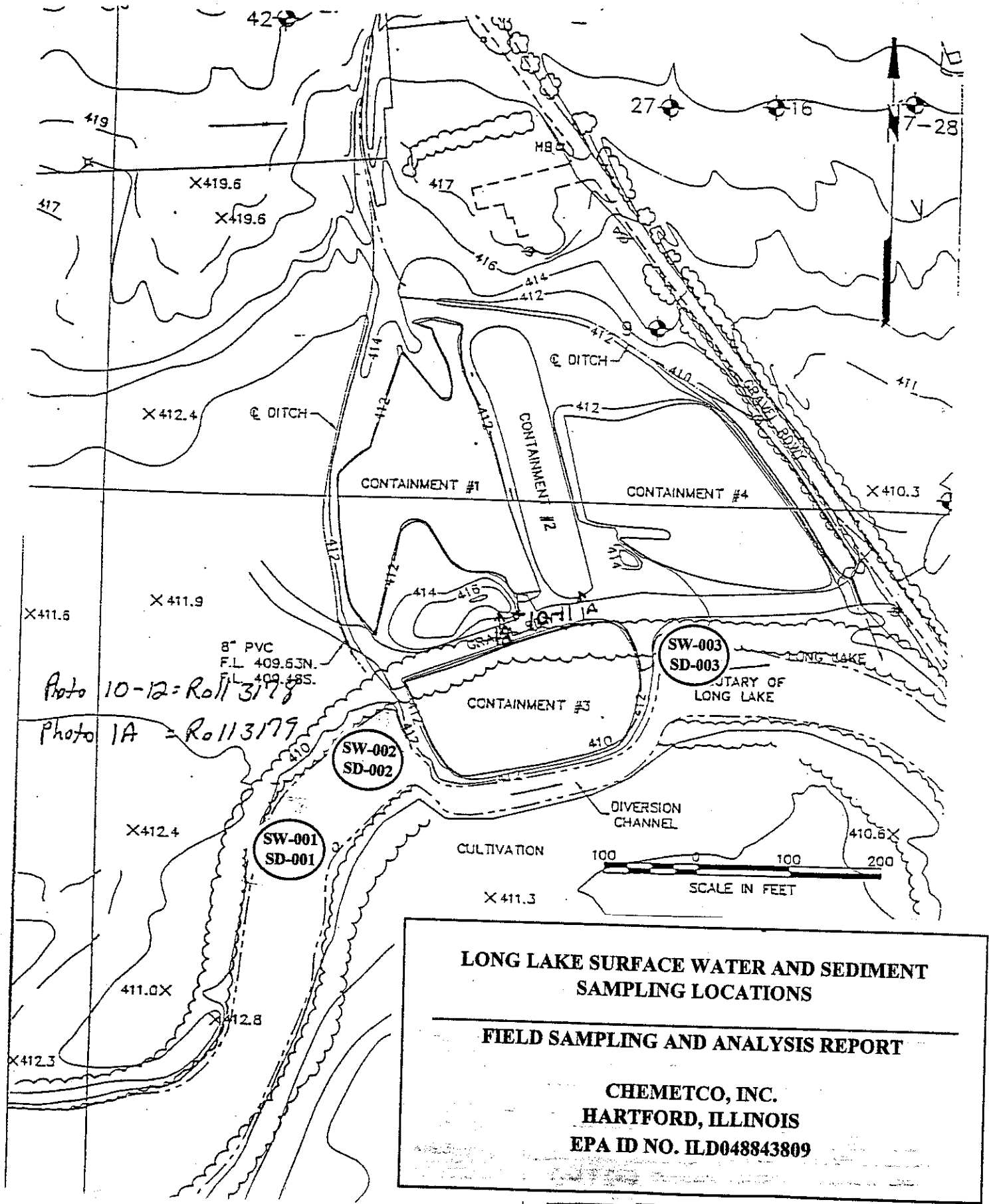

35
34
3A
47
430
450
UNIT 1
UNIT 4
UNIT 5
ZO-001
ZO-002
ZO-003
ZO-004
Refractory Brick Pile
RB-001, 002, 003,
004, 005, 006
Slag Hopper
SL-001, 002, 003,
004, 005
SL-006
SL-007
SL-008
SL-009
SL-010
SL-011
SL-012
SL-013
SL-014
SL-015
SL-016
SL-017
SL-018
SL-019
SL-020



BAGHOUSE DUST SAMPLING LOCATIONS

FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

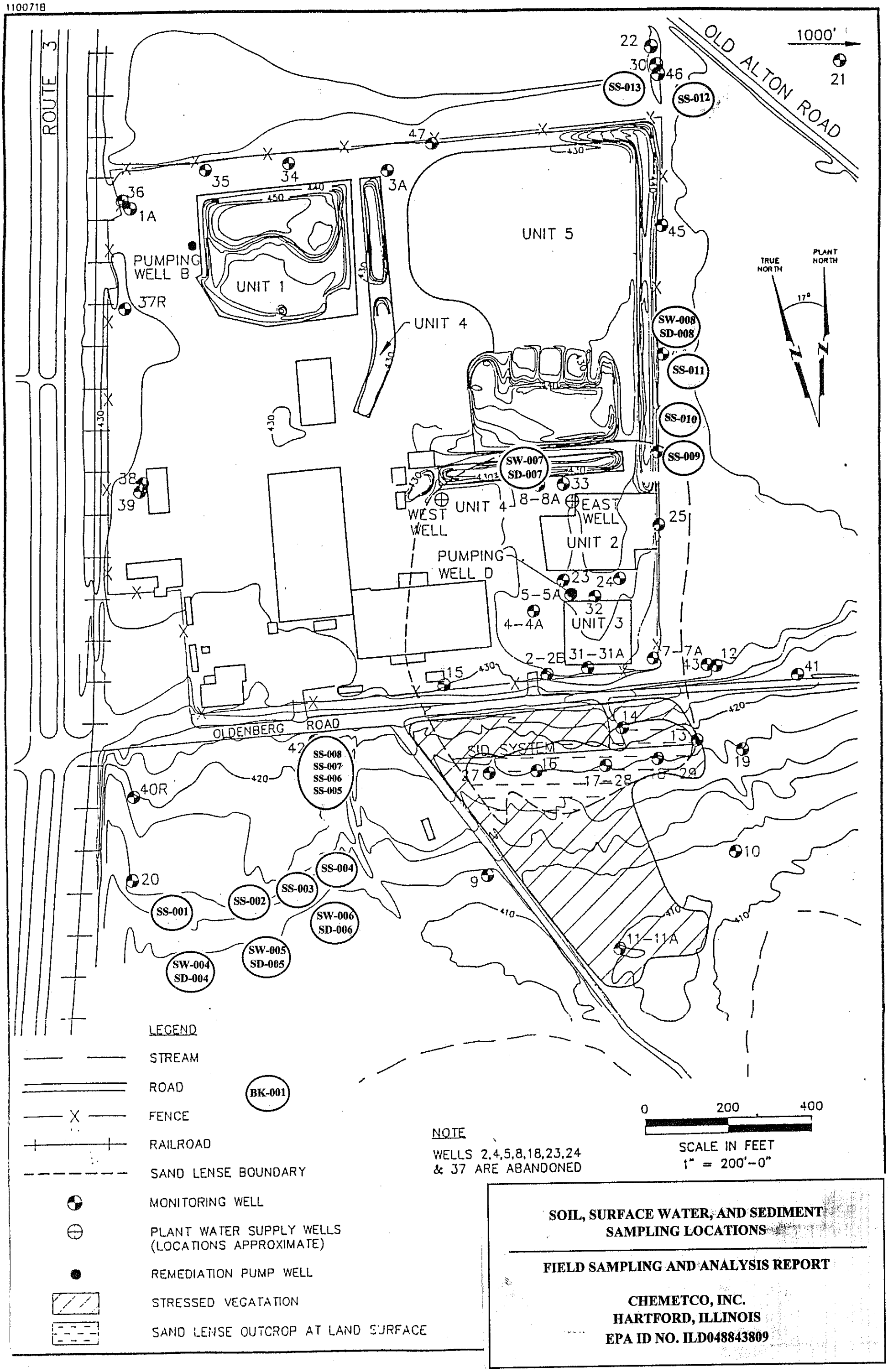


LONG LAKE SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

1100718



LEGEND

- STREAM
- ROAD
- FENCE
- RAILROAD
- SAND LENSE BOUNDARY
- MONITORING WELL
- PLANT WATER SUPPLY WELLS (LOCATIONS APPROXIMATE)
- REMEDIATION PUMP WELL
- STRESSED VEGATATION
- SAND LENSE OUTCROP AT LAND SURFACE
- BK-001

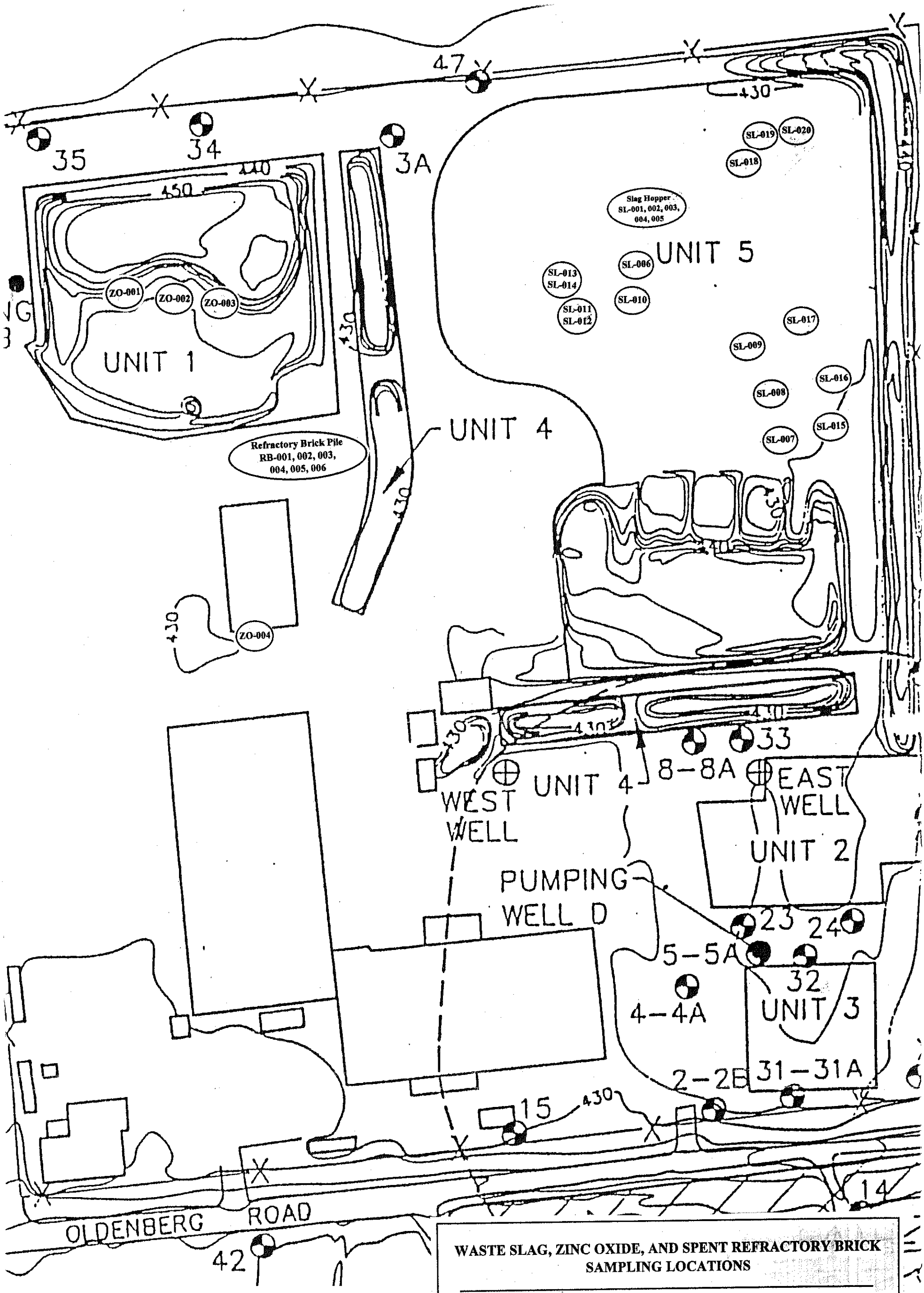
NOTE

WELLS 2,4,5,8,18,23,24 & 37 ARE ABANDONED

SOIL, SURFACE WATER, AND SEDIMENT SAMPLING LOCATIONS

FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809



WASTE SLAG, ZINC OXIDE, AND SPENT REFRACTORY BRICK SAMPLING LOCATIONS

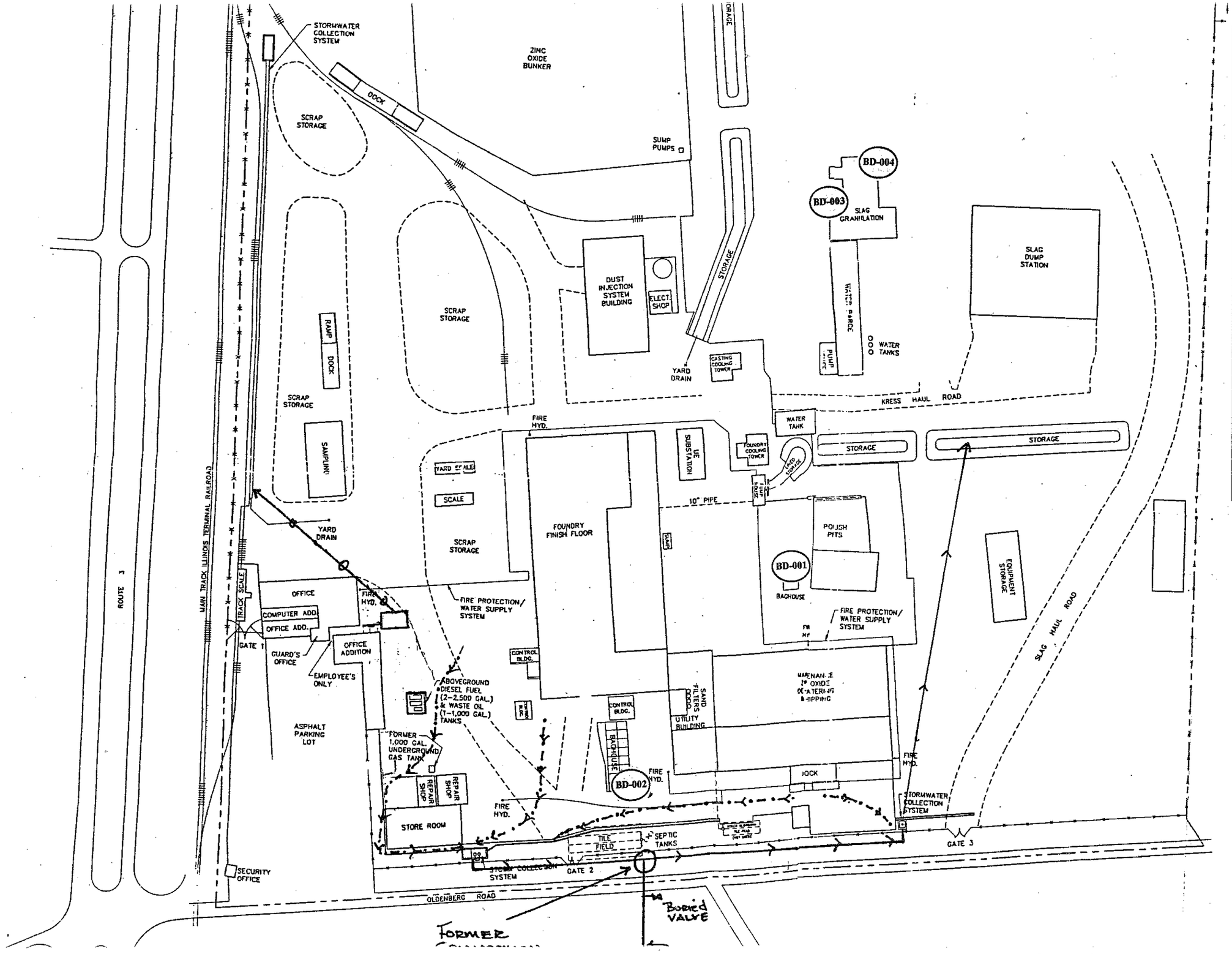
FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809

BAGHOUSE DUST SAMPLING LOCATIONS

FIELD SAMPLING AND ANALYSIS REPORT

CHEMETCO, INC.
HARTFORD, ILLINOIS
EPA ID NO. ILD048843809



NOTE:

THE FENCELINE
MORE PROPER
IS AGRICULTUR
SOUTH IS A T
MORE FARMLA
TOTAL OWNED